IN THE SPECIFICATION

Please amend the paragraphs of the specification as follows:

Please replace the first paragraph on page 1 commencing on line 6 with the following amended paragraph:

This application is a continuation application of ~~co-pending~~ Application Serial No. 09/204,926, filed December 3, 1998, entitled "Noise Characterization in a Wireless Communication System," now ~~allowed~~ U.S. Patent No. 6,275,485, issued on August 14, 2001 to Padovani.

Please replace the first paragraph on page 2 commencing on line 7 with the following amended paragraph:

In general, CDMA systems operate most efficiently when each remote unit receives the forward link signal at the minimum signal quality which is necessary in order to accurately decode the incoming signal. If the forward link signal arrives at the remote unit at a level that is too low, the signal level may not be sufficient to support reliable communications. If the forward link signal arrives at the remote unit at a level that is too high, the signal acts as unnecessary interference to other remote units. Therefore, the remote unit monitors the signal quality at which the signal is received and requests an increase in the power level, at which the base station transmits the forward link signal if the signal quality is too low and requests a decrease in the power level at which the base station transmits the forward link signal if the signal quality is above the threshold.

Please replace the first paragraph on page 3 commencing on line 14 with the following amended paragraph:

Referring again to Figure 2, the decoder 30 receives the symbols corresponding to a frame represented by the vector $\vec{r}$ and converts them to a series of bits. In one embodiment, the decoder 30 is a Viterbi decoder. Typically, the bits output by the decoder 30 are passed to subsequent processing stages (not shown) in order to recreate a transmitted signal. In order to

determine the energy associated with the signal energy in the frame, the bits output by the decoder are re-encoded by a re-encoder 32 which operates in a ~~complimentary~~ complementary manner with the decoder 30 such that the output of the re-encoder 32 is the vector $\vec{d} = (d_1, d_2, \ldots d_N)$ where d_n represents the polarity of the n^{th} symbol as defined above.

Please replace the fifth paragraph on page 6, commencing on line 21, with the following amended paragraph:

Figure 3 is a block diagram showing one embodiment of the non-orthogonal noise determination process. Some of the components (such as a de-interleaver 50, a data rate decision block 54 and an interleaver 58) shown in Figure 3 are dependent upon the processes implemented by the transmitter. These elements are included in the Figure 3 for the purpose of illustration, but may not be necessary in systems which do not incorporate interleaving or multiple data rate transmission. In one embodiment, the components shown in Figure 3 are incorporated in a remote unit which operates in a cellular environment.

Please replace the first paragraph on page 7, commencing on line 8, with the following amended paragraph:

The de-interleaver 50 arranges the symbols in the order in which they were produced by the Viterbi encoder at the transmitter. The re-ordered symbols output by the de-interleaver 50 are input into a Viterbi decoder 52. The Viterbi decoder 52 produces a bit stream according to well-known Viterbi decoding techniques. In one embodiment, the transmitter is capable of sending data at more than one data rate. In order to fully decode the data, a decision must be made as to the rate at which the data was sent. The bit stream output by the Viterbi decoder 52 is input into the data rate decision block 54. The data rate decision block 54 may operate in accordance with, for example, U.S. Patent Nos. 5,566,206 and 5,774,496 each entitled "METHOD AND APPARATUS FOR DETERMINING DATA RATE OF TRANSMITTED VARIABLE RATE DATA IN A COMMUNICATIONS RECEIVER," assigned to the assignee hereof and incorporated herein by this reference in their entirety. The data rate decision block 54 outputs a series of bits at the rate at which they were transmitted and also, in one embodiment, outputs an

indication of that rate. The output of the data rate decision block 54 is subjected to further signal processing (not shown). In addition, the output of the data rate decision block 54 is passed to a re-encoder 56.

Please replace the last paragraph on page 7, commencing on line 29, with the following amended paragraph:

A vector product block 60 multiplies the received vector with the recovered vector. A difference block 62 determines a difference between sets of two values which correspond to two symbols which were transferred in close temporal proximity to one another over the wireless link. A noise estimation block 64 determines the statistical characteristics of noise based upon the statistical characteristics of the output of the difference block 62. In one embodiment, the noise estimation block 64 determines the expected value of the non-orthogonal noise component of the incoming signal. In another embodiment, the output of the noise estimation block 64 is coupled to a signal quality determination unit which determines the signal-to-noise ratio at which the signal is received. In yet another embodiment, the output of the noise estimation block 64 is coupled to a power control block, which requests an increase or decrease in transmission power based upon the statistical characteristics of noise.

Please replace the last paragraph on page 8, commencing on line 15, with the following amended paragraph:

The operation of the invention may be understood by reference to the following explanation and equations. The received symbols can be expressed in terms of the vector $\vec{r}$ and the individual symbol components of the vector $\vec{r}$ can be expressed as shown below in Equation 7.

$$\vec{r} = [r_1, r_2, \ldots r_N] = [(A_1d_1 + w_1), (A_2d_2 + w_2), \ldots (A_Nd_N + w_N)] \qquad \text{(Eq. 7)}$$

wherein: r_n is a voltage value of the n^{th} symbol;

w_n is the noise portion of the n^{th} symbol in volts;

A_n is the absolute value of the voltage level of the signal portion of the n^{th} symbol;

and

d_n represents the polarity (i.e., digital value) of the n^{th} symbol (i.e., +/- 1).

The process of decoding, re-encoding and re-interleaving the received vector $\vec{r}$ produces a recovered vector $\vec{d}$, which represents symbol values in the order in which they were transmitted, e.g. the order in which they were received in the vector $\vec{r}$ as shown in Equation 8.

$$\vec{d} = [d_1, d_2 \ldots d_N] \qquad \text{(Eq. 8)}$$

wherein: d_n = polarity of the n^{th} symbol value, (i.e., +/- 1).

Please replace the first paragraph on page 11, commencing on line 3, with the following amended paragraph:

Figure 4 is a flowchart showing the noise characterization process in accordance with the invention. In block 70, a series of incoming symbols are received and stored. In block 72, the corresponding bits are recovered and re-encoded to produce a series of digital bit values. As shown above, in one embodiment, this process involves de-interleaving and re-interleaving the symbols. Also as shown above, in another embodiment, this process involves determination of a transmission rate. In block 74, the vector product of the received symbols and the recovered symbols is taken. In block 76, the difference between corresponding consecutive symbols is taken. In block 78, the expected value of the difference between the consecutive symbols is taken, which is directly related to the expected value of the noise component of the stored series of incoming symbols. In block 80, the expected value of the noise is used to determine the signal quality (i.e., Eb/Nt) of the forward link signal. Based upon the signal quality, block 82 requests an increase or decrease in power of the signal. In an alternative embodiment, the block 82 may request an increase or decrease in data rate in a similar manner.

Please replace the last paragraph on page 11, commencing on line 17, with the following amended paragraph:

Upon examination of the above written description, a myriad of alternative embodiments within the scope of the invention will be readily apparent to one skilled in the art. For example,

in one aspect of the invention, consecutive symbols as transmitted or simultaneous signals as transmitted are subtracted from one another. In the embodiment shown above, this is accomplished by re-ordering the covered symbols and taking the vector product of the received symbols and the recovered symbols. Obviously, in other embodiments, these processes can be accomplished without the actual re-ordering of the recovered symbols. Instead, a mapping algorithm can be used to associate consecutively or simultaneously transmitted symbols without re-ordering. In addition, the invention was described with reference to a Viterbi encoder and Viterbi decoder combination. Other types of encoders and decoders can be used in conjunction with the teachings of the invention. In the description above, a determination of the characteristics of the non-orthogonal portion of the noise is used to determine a signal-to-noise ratio of a forward link signal, which is in turn used to request an increase or decrease in forward link transmission power from the base station. In other embodiments, the characteristics of the noise are determined for another purpose such as load determination or access control. In some embodiments, the invention can be used to determine higher order characteristics of the non-orthogonal component of the noise. For example, a higher order moment of the noise can be determined. The invention can be applied on either the forward link or the reverse link and, thus, can be housed at either the base station or the remote unit or other type of unit. The invention can be embodied in terrestrial and satellite systems as well as other types of systems.